PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 17941 PCT	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/DK2004/000610	International filing date *(day/month/year)* 15.09.2004	Priority date *(day/month/year)* 26.09.2003
International Patent Classification (IPC) or national classification and IPC H04M1/05, H01H35/02		
Applicant GN NETCOM A/S		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 8 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the opinion
☐	Box No. II	Priority
☒	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
25.06.2005	06.09.2005
Name and mailing address of the international preliminary examining authority: European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer de Biolley, L Telephone No. +31 70 340-3137

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/DK2004/000610

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3 and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4)
   - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-6	received on 25.06.2005 with letter of 23.06.2005

Claims, Numbers

1-6	received on 25.06.2005 with letter of 23.06.2005

Drawings, Sheets

1/2, 2/2	as originally filed

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application,

☒ claims Nos. 2,6

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (specify):

☒ the description, claims or drawings *(indicate particular elements below)* or said claims Nos. 2,6 are so unclear that no meaningful opinion could be formed *(specify)*:

see separate sheet

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☐ no international search report has been established for the said claims Nos.

☐ the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that:

the written form	☐	has not been furnished
	☐	does not comply with the standard
the computer readable form	☐	has not been furnished
	☐	does not comply with the standard

☐ the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with the technical requirements provided for in Annex C-*bis* of the Administrative Instructions.

☐ See separate sheet for further details

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1,3-5
	No:	Claims	
Inventive step (IS)	Yes:	Claims	3,4
	No:	Claims	1,5
Industrial applicability (IA)	Yes:	Claims	1,3-5
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item III.

The terms "vertically", horizontal", "vertical" and "horizontally" used in claims 2 and 6 are unclear and leave the reader in doubt as to the meaning of the technical feature to which they refer (any channel comprised in a headset can be oriented vertically or horizontally provided the user holds the headset in an appropriate orientation), thereby rendering the definition of the subject-matter of said claims unclear, Article 6 PCT.

Re Item V.

1 The following documents are referred to in this communication:

D1: US 2002/021800 A1 (BJERRUM-NIESE CHRISTIAN ET AL) 21 February 2002 (2002-02-21)

D2: US-B-6 198 059 (JOU TIEN-MING) 6 March 2001 (2001-03-06)

D3: US-A-4 503 299 (HENRARD JOSE ET AL) 5 March 1985 (1985-03-05)

2 INDEPENDENT CLAIM 1

2.1 The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and shows (the references in parentheses applying to this document):

A headset (fig. 1, ref. 1) having an electrical circuit comprising a printed circuit board (paragraph 49; fig. 2, ref. 13), wherein the headset has a number of control knobs (fig. 11, ref. 108, 110, 112) for adjusting the electrical properties of the headset and wherein the functions of the control knobs may be adapted in dependence on the orientation of the headset (paragraph 62),
characterized in that the printed circuit board has incorporated therein a gravitation switch which is adapted to switch the functions of the control knobs (paragraph 63).

The subject-matter of claim 1 differs from this known headset in that D1 does not specify that the gravitation switch comprises at least one elongated channel that houses a moveable conducting object, and that through-platings are provided at the ends of the channel.

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

2.2 The solution to this problem proposed in claim 1 of the present application cannot be considered as involving an inventive step (Article 33(3) PCT) for the following reasons: In view of paragraph 63 of D1, the skilled person, looking for a suitable gravity switch, would regard it as a normal option to include the tilt switch described in document D2 (see D2, fig. 6 and col. 3, line 32 to col. 4, line 23) thereby arriving at the headset according to claim 1.

3 DEPENDENT CLAIM 5

Dependent claim 5 do not contain any features which, in combination with the features of any claim to which it refers, meet the requirements of the PCT in respect inventive step (Article 33(3) PCT). Concerning this claim, the following passage is of interest : D1, paragraph 62

4 DEPENDENT CLAIMS 3, 4

The combination of the features of dependent claims 3 and 4 is neither known from, nor rendered obvious by, the available prior art. The reasons are as follows:

4.1 A gravitation switch comprising a set of sub-channels is known from D3 (see D3, fig. 5b and col. 3, lines 30-54). However, such a switch, designed to be included in a gaming control-lever, would not be suitable for the present application.

4.2 A gravitation switch comprising a conducting object formed by a ball or a cylinder of conducting rubber is not know from, nor rendered obvious by, the available prior art.

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The invention relates to a headset having an electrical circuit comprising a printed circuit board, wherein the headset has a number of control knobs for adjusting the electrical properties of the headset, and wherein the functions of the control knobs may be adapted in dependence on the orientation of the headset.

Headsets for use in connection with telephony, be it mobile telephony or public switched telephony, from being passive units, are today equipped with electronics and control knobs, so that various functions, such as volume control, answering of calls, interruption of calls, etc., may be initiated directly from the headset.

The headsets are moreover of compact structure and are made inter alia in lightweight versions which may be placed on the left or the right ear by means of an ear hook.

It is noted in this connection that a headset with an ear hook to be used on the right as well as the left ear requires that the headset itself is rotated 180°, which means that control knobs offset relative to the horizontal axis of symmetry of the headset will change their positions.

This may be a discomfort to users if e.g. a knob for volume control, which is normally disposed lowermost, changes its position to being disposed uppermost.

A solution to this problem is found in WO 01/37524, where logic circuits, which may optionally be controlled from a mobile telephone, are adapted to configure the control knobs for use in connection with switching the headset from one ear to the other.

US 2002/0021800 A1 discloses a headset, where it is suggested to use a

gravitation detection system for knowing the orientation of the headset. Nothing in the US publication discloses how to use the gravitation detection system.

Accordingly, an object of the invention is to provide a simple change of the functions of the control knobs of the headset, so that if the position of the headset and thereby of the control knobs is changed, then the functions of the control knobs will be changed mutually such that a user does not notice a change in the functions of the control knobs relative to their positions.

The object of the invention is achieved by a headset of the type defined in the introductory portion of claim 1, which is characterized in that the printed circuit board has incorporated therein a gravitation switch which is adapted to switch the functions of the control knobs, said gravitation switch comprising at least one elongated channel that houses a moveable conducting object, and that through-platings are provided at the ends of the channel.

Hereby, the changes in the functions of the control knobs take place without intervention by a user.

Further, a number of automatic switching functions of the control knobs of the headset may be provided, merely by orienting the headset in a given direction.

When, as stated in claim 2, the channel is oriented vertically, a simple structure of a switching arrangement is achieved, when a headset is switched for use from the left ear to the right ear, or vice versa.

To improve the flexibility of the headset additionally, it is an advantage if, as stated in claim 3, a set of channels is configured as three sub-channels in a

star configuration, which provides for more automatic settings of the functionalities of the headset.

When, as stated in claim 4, the conducting object is formed by a ball or a cylinder of conducting rubber, a steady and noiseless switching of the functions of the headset is achieved.

When switching the functions of the control knobs of the headset when the headset is placed on the one ear and is switched to the other ear, the changes in the functions of the control knobs are performed if, as stated in claim 5, the number of control knobs is two and the gravitation switch comprises the channel with the conducting object which, when the conducting object is at one end of the channel, controls a switching circuit which will cause the uppermost control knob to perform a first function and the lowermost one to perform a second function, and when the gravitation switch is at the opposite end of the housing, corresponding to the uppermost control knob switching to being the lowermost control knob and the lowermost control knob to being the uppermost control knob, then the switching circuit will cause the uppermost and lowermost control knobs to still perform the first function and the second function, respectively.

Finally, it is an advantage if, as stated in claim 6, two of the channels in the set of channels are arranged symmetrically relative to the horizontal and extend obliquely to the same side relative to the vertical, while the third channel extends horizontally, as the third channel may then be used as a connection to a charging circuit when the third channel of the headset is disposed vertically.

The invention will then be explained more fully with reference to the drawing, in which

fig. 1 shows the principle in the switching of the control knobs of a headset,

fig. 2 shows the principle in a first embodiment in the configuration of a gravitation switch with a channel for a headset according to the invention, while

fig. 3 shows a set of channels for use in a gravitation switch according to the invention.

In fig. 1, the numeral 1 designates a headset, e.g. of the type known from WO 01/86923, which may be used by a user on the right as well as the left ear, as the ear hook of the headset may be mounted in two positions, there being a difference of 180° between the positions. When switching from one ear to the other, the headset itself must also be rotated 180°, as the loudspeaker of the headset must be directed toward the user's ear.

As will be seen in fig. 1, the headset has control knobs 2, 3. Further, a circuit 5 is shown schematically, which is shown outside the headset for clarity, but is incorporated in it in practice. This circuit inter alia has an on/off switch 6 and a volume control 7, which may be operated by means of the control knobs 2 and 3.

The circuit 5 is built on a printed circuit board, and this printed circuit board has embedded therein a gravitation switch, whose basic structure is shown in fig. 2.

The gravitation switch consists of a conducting object, such as a ball 18 or a cylinder of conducting rubber 18, which may be moved inside a channel 19, defined by two walls 20, 21, between a first set of through-platings 14, 15 on the printed circuit board and a second set of through-platings 16, 17

on the printed circuit board. The gravitation switch is embedded in the printed circuit board such that it is parallel or almost parallel with the control knobs 2, 3, cf. fig. 1. Control circuits 12, 13 are connected to the two sets of through-platings 14, 15 and 16, 17.

These control circuits are adapted to control the four switches, which are designated 8, 9, 10, 11 in fig. 1, in the following manner.

If the conducting ball 18 short-circuits the through-platings 14, 15, then the switches 8, 9 will be open, while the switches 10, 11 will be closed, which means that the volume control 7 may be operated by the control knob 3, while the on/off switch 6 may be operated by the control knob 2.

If the headset is turned when switching from one ear to the other, then the ball 18 will leave the through-platings 14,1 5 and instead short-circuit the through-platings 16, 17, which then causes the switches 8, 9 to close and the switches 10, 11 to open, which means that the control knob 3 activates the on/off switch 6, while the control knob 2 activates the volume control 7.

The functions of the control knobs relative to their positions may thus be maintained, no matter whether the headset is rotated physically.

It is noted that the control circuits shown in fig. 2 may be implemented as a single microprocessor which is informed of the orientation of the headset via the through-platings and, on the basis of this, may implement the switching of the control knobs from controlling one functionality to another functionality.

Fig. 3 shows a set of channels which provide more functions than the channel in fig. 2.

This figure also shows the conducting ball 18 which may be moved in a set of channels consisting of three channels 22, 23, and 24.

Each of the channels has through-platings which are designated 27, 28 for the channel 22, are designated 25, 26 for the channel 23, while the through-platings of the channel 24 are designated 29, 30.

In this configuration, the channels 22, 23 may expediently be used for switching the functions of the control knobs in dependence on whether a headset is used on the right or the left ear, while the last channel 24 may e.g. be used for connection of a charging circuit to the headset, if it is e.g. arranged in a holder so that the channel 24 is oriented vertically.

Although the invention has been explained in connection with two control knobs, nothing within the scope of the claims prevents it from being implemented with more control knobs, as the control circuits may readily be dimensioned for controlling the functions of several switches.

Also, more channels than three may be introduced into the set of channels.

PATENT CLAIMS

1. A headset having an electrical circuit (5) comprising a printed circuit board, wherein the headset has a number of control knobs (2, 3) for adjusting the electrical properties of the headset, and wherein the functions of the control knobs (2, 3) may be adapted in dependence on the orientation of the headset, c h a r a c t e r i z e d in that the printed circuit board has incorporated therein a gravitation switch (18, 19) which is adapted to switch the functions of the control knobs (2, 3), said gravitation switch comprising at least one elongated channel that houses a moveable conducting object, and that through-platings (14, 15, 16, 17) are provided at the ends of the channel.

2. A headset according to claim 1, c h a r a c t e r i z e d in that the channel (19) is oriented vertically.

3. A headset according to claims 1 – 2, c h a r a c t e r i z e d in that a set of channels (22, 23, 24) is configured as three sub-channels in a star configuration.

4. A headset according to claims 1 – 3, c h a r a c t e r i z e d in that the conducting object (18) is formed by a ball or a cylinder of conducting rubber.

5. A headset according to claims 1 – 4, c h a r a c t e r i z e d in that the number of control knobs (2, 3) is two, and that the gravitation switch (18, 19) comprises the channel (19) with the conducting object (18) which, when the conducting object is at one end of the channel, controls a switching circuit (12, 13) which will cause the uppermost control knob (3) to perform a first function and the

lowermost one (2) to perform a second function, and when the gravitation switch is at the opposite end of the housing, corresponding to the uppermost control knob (3) switching to being the lowermost control knob (2) and the lowermost control knob to being the uppermost control knob, then the switching circuit will cause the uppermost and lowermost control knobs to still perform the first function and the second function, respectively.

6. A headset according to claims 3 – 5, c h a r a c t e r i z e d in that two of the channels (22, 23) in the set of channels are arranged symmetrically relative to the horizontal and extend obliquely relative to the vertical, while the third channel (24) extends horizontally.